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**METHOD FOR DECODING CHARGING DATA RECORDS IN MOBILE  
TELEPHONE NETWORKS AND THE RELATIVE SYSTEM**

**Technical Field**

The present invention tackles the problem of decoding  
5 the so-called Charging Data Records (normally known by the  
acronym CDR) emitted by the nodes of a mobile telephone  
network.

**Background Art**

These charging data records are currently decoded by  
10 employing solutions based on software applications, which,  
for example, decode GSM network records separately from those  
of an associated GPRS network. Specifically, the application  
is developed manually starting from the record coding  
specifications, and each time there is a modification/new  
15 release of the GSM and/or GPRS systems and when new functions  
are added, parts of the software must be to some extent  
rewritten.

There is consequently a need to provide solutions that  
can decode both GSM and GPRS format records, and for  
20 solutions that take into account the frequent updating of the  
record format after the introduction of new GSM and GPRS  
network services/performances, as well as the possibility of  
easy extension of the application to new functions such as  
UMTS.

25 This objective can be reached, according to this  
invention, by using a method that has the features referred  
to specifically in the claims that follow. The invention also  
refers to the relative system.

**Summary of the invention**

30 The solution, according to this invention, basically  
envisages the automatic generation of the logic that decodes  
the records. Whereas known solutions include the rewriting of  
the record decoding software whenever variations are

introduced by the MSC manufacturer (Mobile Switching Center) or SGSN/GGSN (Serving GPRS Support Node and Gateway GPRS Support Node), the solution according to the invention simply requires the manufacturer to provide a formal record  
5 description of the ASN.1 type (Abstract Syntax Notation One). The solution, according to the invention, then uses this description to directly generate the code that decodes the data record. As a result, the decoder adaptation times can be cut from several weeks to a few days, making it easy to keep  
10 right up to date with the mobile network's frequent alterations.

The solution, according to the invention, includes the decoding of GSM records and GPRS records, which means that a single tool can be used on a mixed network employing both  
15 technologies. This is particularly advantageous if you consider that the operators of large-scale mobile telephone networks use both technologies in the network, in conditions in which the network update is carried out asynchronously. The solution, according to the invention, proposes to decode  
20 the data records for GSM and GPRS functions, but its main features also make it easy and quick to extend the solution to other functions such as UMTS.

#### **Brief Description of Drawings**

The invention is hereafter described, by way of a non-  
25 limiting example only, with reference to the annexed drawings wherein:

- Figure 1 is a functional block diagram illustrating the general architecture and the input/output/control relationships of a system that operates according to the  
30 invention, and
- Figure 2 is a flow diagram illustrating the main stages into which the method is divided according to the invention.

### Detailed description of the preferred embodiments

As shown in Figure 1, the illustrated system, referred to with the number 10, has a main element, which is a processing core 12, destined to input a file to be decoded 14, which then outputs a corresponding decoded file 16. The system 12 works on the basis of a decoding logic that is directly self-generated from the formal description ASN.1 contained in a file 20 received from the outside. As already known, the description of the records in ASN.1 (or equivalent, and consequently a description "of the ASN.1 type") constitutes a set of specifications that describe the coding format of the records in ASN.1 Notation or equivalent.

The input or log file 14 contains the records generated by the real network equipment (MSC for GSM records or SGSN/GGSN for GPRS records) in coded hexadecimal format.

The decoding operation is run on the basis of the set of user parameters that characterise the log file, the type of record (SGM/GPRS) and the output format.

In particular, starting from an initial step 100, the first steps in the operating sequence of the system 10 include the reading of the parameters sent to output, which are:

- type of record to be decoded: GSM or GPRS (read by the system in step 102),
- name of the log file to be decoded (step 104),
- decoding format, i.e. the output format of the decoded file (read in step 106); this format may be "long", when the decoding, the length and the contents in hexadecimal are given for each record field, or "short", when only the decoding is given for each record field,
- log file containing the records to be decoded (step 108), and
- formal record description of the ASN.1 type (step 110).

Depending on the record description, an interpreter, such as an ASN.1 interpreter, included in the processing core 12 (see block 18 in Figure 1) creates and runs a series of procedures (collectively referred to as 112), which in terms of a self-  
5 generation operation, create an updated version of the GSM decoder (step 114) or GPRS decoder (step 116) according to the type of record read in step 102.

The type of decoder selected (114 or 116) according to the parameter indicating the type of record (step 102) is  
10 further parameterised according to the parameters read in steps 104 and 106 (log file name and decoding format).

Once the decoder has been updated and programmed, it inputs (step 118) the file 14 containing the records to be decoded, and then outputs (step 120) the file containing the  
15 records decoded in text format. Reference 122 indicates the final step in the procedure.

Naturally, numerous changes can be made to the construction and embodiments of the invention envisaged and illustrated herein, without however departing from the scope  
20 of the present invention.